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Galen Clark

THE BIG TREES OF CALIFORNIA

THEIR HISTORY AND CHARACTERISTICS

By GALEN CLARK

Discoverer of the Mariposa Grove of Big Trees, Author of "Indians of the Yosemite," and for many years Guardian of the Yosemite Valley

Illustrated from Photographs

YOSEMITE VALLEY, CALIFORNIA
GALEN CLARK
1907

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Photograph by Sweeney.

GENERAL GRANT TREE, GENERAL GRANT NATIONAL PARK.

Claimed to be the largest tree in the world.

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PROLOGUE

"I have been to the woods, I have trod the green dell,
And the spirit of beauty was there;
I saw her white form in the snowdrop's white bell,
I heard her soft voice in the air.

She danced in the aspen, she sighed in the gale,
She wept in the shower, she blushed in the vale;

Her mantle was thrown o'er the misty brake;
Her splendor shown in the sparkling lake.

I felt her breath in the breezes of even,
Her robe floated over the blue vault of heaven.

Wherever I roved over vale, wood or hill,
The spirit of beauty would follow me still.

Not a wildbriar rose its fragrance breathed,
Not an elm its clustering foliage wreathed,

Not a violet opened its eyes of blue,
Not a plant or flower in the valley grew,

Not an ivy caressing the rock in the wall,
But the spirit of beauty was over them all."

And I've been to the groves of Sequoia Big Trees,
Where beauty and grandeur combine,
Grand Temples of Nature for worship and ease,
Enchanting, inspiring, sublime!

Photograph by Reichel. 15

GRIZZLY GIANT, MARIPOSA GROVE.

Height, 224 feet; circumference of limb 100 feet from ground, 20½ feet.

The BIG TREES *of* CALIFORNIA

THE Big Trees of California *(Sequoia Washingtoniana)* are located on the western slope of the Sierra Nevada Mountains, near a central line between the summit peaks and the foot hills of the range, at an average elevation above sea level of about 6,500 feet, and distributed north and south for a distance of about two hundred and fifty miles.

They are found in groups or groves closely associated with

other forest trees, mostly pines and firs, with intervening spaces of greater or less extent between groves. Very rarely is a solitary tree found far away from its kindred groups.

Possibly these trees existed at one time in a great continuous forest, which has been divided into the present separate groves by the great glaciers which eroded the deep canyons on the western face of the mountain range, such as the Tuolumne Canyon, the Yosemite Valley, Kings River Canyon and others.

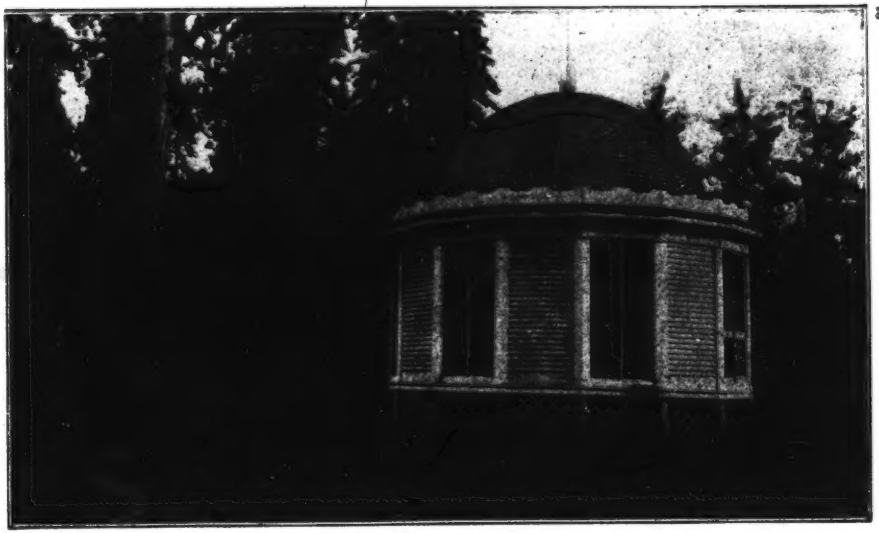
Origin of the Big Trees.

THE present Big Sequoias, now only found in a few limited groves in California, are regarded by scientists as the scanty and sole survivors, with but slight variation, of an ancient order of forest trees which flourished extensively during the cretaceous and tertiary periods of the earth's life, contemporaneous with such huge animals as the dinotherium, megatherium, mammoth, and monster reptiles long since extinct.

In that remote period prob-

ably the climatic conditions were more favorable for extensive distribution of these trees than at present. Fossil remains of this species are said to have been found in the northern hemisphere on three continents, Europe, Asia and America. There now seems to be no good reason why these Big Trees in California should become extinct for many centuries yet to come, if properly guarded and protected from the ruthless axes and saws of lumbermen.

Californians as a mass have not yet fully realized the great value to the State of this mag-



Photograph by Fiske. **DANCING PAVILION ON STUMP OF BIG TREE.**
Calaveras Grove.

nificent endowment of Nature, one of her most precious crown jewels, which aids in attracting thousands of visitors and millions of dollars annually.

Distribution of the Big Trees.

THE most northerly group of Big Trees consists of a few trees in Placer County, on a tributary of the American River, none of which is of large dimensions.

The next grove south is the Mammoth or *Calaveras Grove,* in Calaveras County. This grove was the first to be discovered and made known to the public. It contains about one hundred trees, some of which are of very large dimensions. The grove known as

the *South Calaveras Grove* is about eight miles distant, in Stanislaus County, containing about one thousand trees. These two groves are now owned by a lumber company.

In Tuolumne County, on a small tributary of the South Fork of the Tuolumne River, there is a small grove known as the *Tuolumne Grove,* in which are some very large fine trees. The Big Oak Flat & Yosemite stage road passes through this grove.

A few miles southwest of the Tuolumne Grove, on Moss Canyon Creek, in Mariposa County, there is a small grove

Photograph by Fiske. 27

ILLINOIS TREE, TUOLUMNE GROVE.
Diameter, 28 feet.

known as the *Merced Grove*, which also has some fine specimens. The Coulterville & Yosemite stage road passes through this grove.

The Mariposa Grove.

THE next grove south is the *Mariposa Grove,* in Mariposa County, located between three and four miles southeast of Wawona. The grove is situated in a depression on a mountain ridge on the head waters of a branch of Big Creek, which empties into the south fork of the Merced River, near Wawona. Wawona is the headquarters of the Yosemite Stage & Turnpike Company, on the stage routes from Raymond and Mariposa to Yosemite Valley.

The Mariposa Grove is easy of access by carriage road, and contains six hundred trees, some of them being among the largest in the State. In the main portion of the grove the road makes a wide loop, so that many of the largest trees may be seen from the carriage. This grove, including four square miles of territory, was ceded to the State of California in trust as a public park in June, 1864, by the same Act of Congress that ceded the Yosemite Valley to the State under similar conditions. This grove of Big Trees has since been under the protection and management of

Photograph by Reichel.

GUARDIAN'S CABIN, MARIPOSA GROVE.

the Yosemite Commissioners, and is the only grove of Big Trees in the State which is entirely free from private claims. Together with the Yosemite Valley it has recently been receded by the State of California to the National Government.

About ten miles nearly southeast of the Mariposa Grove, in Madera County, there is another grove of Big Trees, on a small north branch of the Fresno River. This grove was named the *Fresno Grove*, as it was then in Fresno County, and when first discovered in 1857 contained about six hun-

dred trees, one of the largest measuring eighty-three feet in circumference four feet above the ground. A large number of these trees have now been cut down and sawed into lumber.

Still further south is a small grove in Fresno County on Dinky Creek, a tributary of Kings River from the north.

General Grant and Sequoia National Parks.

SOUTH of the south fork of Kings River, in Fresno County, there commences an extensive belt or forest of Sequoias, three or four miles in width, and extending south across Tulare County nearly to the north boundary of Kern County for a distance of over sixty miles, with but small breaks caused by deep canyons.

This extensive area has been divided by some writers into different local groves. That portion in Fresno County is

known as the *Kings River Grove,* and also the *Fresno Grove.* Proceeding south, we find the *Kaweah Grove,* and *Tule River Groves* (North Fork and South Fork) in the basins of Kaweah and Tule Rivers respectively.

Two public parks have been established by the Federal Government in this extensive Sequoia forest,—the General Grant National Park, four square miles in extent, in the Kings River Grove, and the Sequoia National Park, containing two hundred and fifty square miles, in the Kaweah River Grove. These Parks, to-

Photograph by Sweeney.

GENERAL GRANT TREE, GENERAL GRANT NATIONAL PARK.
Diameter at base said to be 40 feet.

gether with the Yosemite National Park, are guarded every summer season by detachments of United States cavalry.

In every grove of Big Sequoias in the State, except the small group in Placer County, there are to be found some fine large specimens of these grandest of forest trees. Persons who are able to visit only one of the smaller groves can get a good idea of the general appearance and character of this species of trees; but the larger groves are much more interesting and impressive in their awe-inspiring grandeur.

Size of the Big Trees.

THE average height of the large sized Sequoias is about two hundred and seventy-five feet, though some few have been found to exceed three hundred and twenty-five feet in height. Their average diameter at the ground is about twenty feet, though in nearly every grove there are some which exceed thirty feet in diameter. The difference of a few feet, however, in the diameter of the largest trees, is not perceptible to the eye, and only by actual measure-

ment can such variations be ascertained.

The first impression, when viewing the largest of these trees, may be one of disappointment. The body of the tree being round, and very symmetrical in form and height, its size is somewhat deceptive. But when some familiar object, such as a person or a horse, is placed alongside the tree, the illusion is quickly dispelled.

Another cause of this occasional sense of disappointment is caused by the fact that most of the measurements published are taken at the base of the

Photograph by Hallett-Taylor Co. 45

IN THE MERCED GROVE.

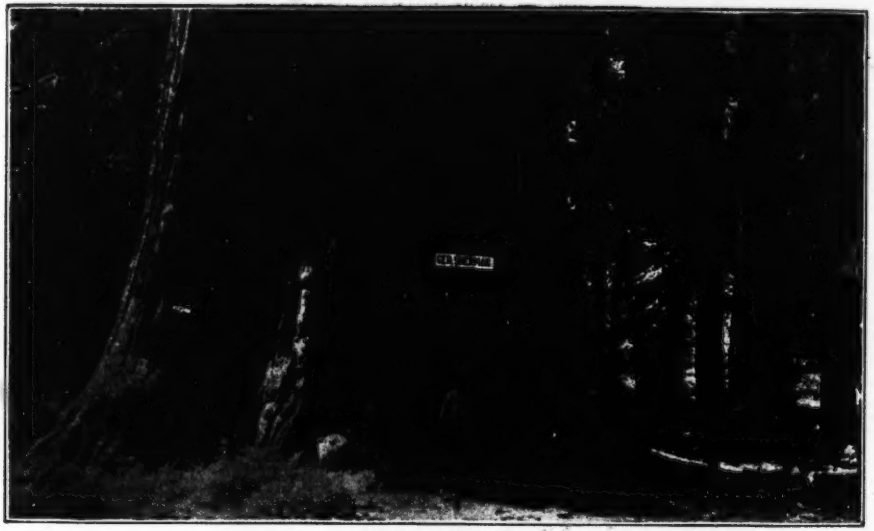
tree near the ground, which is larger than the body of the tree a few feet above. Persons taking measurements for publication should state whether taken near the ground or how many feet up.

Age of the Sequoias.

THE extreme age attained by some of the Big Trees will ever be an unsettled question. In examining the remains of fallen trees, the annual ring growth varies very much in different specimens, some of them averaging many more rings to the inch than others, according to variations in local conditions, whether favorable to a vigorous growth or not. The number of rings near the heart of the largest old fallen trees examined, aver-

age about ten to the inch. Near the outside surface they average fifty or more to the inch.

In the pickets of the fence which now surrounds the General Sherman tree in the Sequoia National Park, made from an old fallen tree in the near vicinity, those examined by myself and others present had fifty rings to the inch. This would make an increase of two inches in the diameter of the wood part of the tree in fifty years. The outside sap wood of the tree undoubtedly had over sixty rings to the inch. Apparently some of the largest old fallen trees, like the



GENERAL SHERMAN TREE, SEQUOIA NATIONAL PARK.
Height 285 feet, circumference at base, 102 feet.

Forest Giant in the Mariposa Grove, may have attained the age of over six thousand years before they were uprooted.

Many of the largest old trees in all the groves have been badly injured by fire. This is more evident in the northern groves than in those south of Kings River. In the Sequoia National Park there is no evidence that any extensive fires have spread through the forest for the past one hundred or more years. There is such a dense growth of green vegetation covering the ground where most of the Sequoias grow, that fires cannot now spread sufficiently to do much damage.

55

MOTHER OF THE FOREST, CALAVERAS GROVE.

Diameter 32 feet; height 325 feet. The bark was removed for the Paris Exposition of 1860.

Habits and Characteristics.

THE Big Tree is an evergreen, and is the largest and scarcest of all forest trees. Its foliage is very short, about one-fourth of an inch in length, ovate-acuminate in form, and scale-like, adhering closely to the small branchlets. In young trees the leaves are about half an inch in length, very narrow and sharp-pointed, linear-lanceolate, lying closely to the slender twigs, pointing forward.

In young trees, during their first two or three centuries of

life, the tapering body is thickly covered with slender branches, which are erect and aspiring above, to catch the electric ether from the atmosphere, which is one of their most vital sources of life; horizontal near the middle of the tree, and drooping below, from the heavy weight of winter snows and lack of nourishment. As the tree enlarges in size the lower branches die and fall away, leaving the body of the tree bare for one hundred feet or more up.

The tops of the younger medium-sized trees develop into a graceful dome form in out-

EMPIRE STATE TREE.
Calaveras Grove.

line, but on many of the largest old trees the top branches have been broken down by the heavy weight of snow in winter and great wind storms.

Throughout all the different groves, the Sequoias seem to have naturally arranged themselves into family groups and social clusters, selecting choice localities where the soil is most suitable and well supplied with their favorite condition of moisture, of which they require a much greater quantity than the large pine and other forest trees. Their majestic, graceful beauty is unequalled. Since their discovery they have be-

come one of the great wonders of the world. The bright cinnamon color of their immense fluted trunks, in strong contrast to the green foliage and dark hues of the surrounding forest, makes them all the more conspicuous and impressive. In their sublime presence a person is apt to be filled with a sense of awe and veneration, as if treading on hallowed ground.

In the growth of the tree there is an annual inside new thin growth of bark formed in contact with the new outside annual ring growth of wood. The parting of the old outside

bark into ridges is caused by the gradual increase in the size of the tree inside the bark.

The color of the bark gradually changes from a dark purple tint to a cinnamon color, and becomes corrugated into narrow vertical ridges. On full grown trees, where well sheltered and protected from fierce storms, these ridges of bark are sometimes found two feet in thickness, in rare instances three feet. The average thickness is probably about fifteen inches, and, where openly exposed to storms, still less.

Photograph by Fiske.

FOUR GUARDSMEN, MARIPOSA GROVE.

Cones and Seeds.

THE cones or fruit of the tree average about the size of a hen's egg. It takes two years for the seeds to mature in the cones, which they do late in the fall, although the cones do not dry and shrink so as to shed the seeds until the third season. The seeds are of a light golden color, small and flat, about the size and shape of a parsnip seed.

The seeds have no wing appendage like those of the pines and firs, only a blank margin

of shell on each side, a little wider than the vital germ in the center. There is a small amount of purple-colored gum about the seeds in the cone, which falls out in dust with the seeds when they drop. This gum is of the same character as that which exudes from the body of the tree where it has been deeply burned, and is readily soluble in water.

An analysis of this gum at the United States Department of Agriculture, Bureau of Chemistry, gives the following result:

	Per Cent
Moisture at 100°	12.79
Wood Scrap	.81
Tannin	34.63
Nontannin	51.77

Photograph by Sweeney.

CONES AND FOLIAGE OF THE BIG TREES

Professor H. W. Wiley, Chief of the Bureau, says: "The material possesses none of the physical nor chemical properties of wood gums; it is optically inactive, non-cohesive and contains neither glucosides nor pentosans. The non-tannins are chiefly protocatechuic acid with smaller amounts of catechol, gallic acid, etc. The tannin is largely a catechol tannin, although some gallotannic acid is present. The material is interesting, not only in containing a large percentage of tannin, but also because it contains so little of the insoluble decomposition

products of catechol tannin."

The material gave 3.60 per cent. of ash which contained:

	Per Cent
Calcium oxid (Cao)	11.22
Magnesium oxid (Mgo)	8.33
Potassium oxid (K_2O)	50.00
Sodium oxid (Na_2O)	1.25
Phosphoric acid (P_2O_5)	Trace

This gum is not inflammable, like resinous gums, but strongly resists the action of fire. Whether in its fluid state in the body of the tree it aids in sustaining the tree's vitality against destructive elements, is not certainly known, but probably is true. It undoubtedly gives the red

Photograph by Fiske. FALLEN MONARCH, MARIPOSA GROVE.
Length, 285 feet; diameter, 26 feet.

color to the wood inside of the thin white sap wood next to the bark.

Young Sequoias.

THERE are but very few young Sequoias to be seen in any of the groves. This is not the fault of the seeds. The surface of the ground in the groves is so deeply covered with the dry fallen matter from the trees, and dead vegetation, that the seeds in falling very seldom come in contact with the bare ground; but where a tree has been recently uprooted, or where fire has burned away the dry covering, the young trees spring up as thick as grain in a field, and

only need proper protection for some of them to continue to grow.

Groves of young Sequoia trees can readily be started anywhere on suitable moist ground in the forests of California, at an elevation of less than 7,000 feet above sea level, by burning off the dry rubbish covering the ground and planting good seed.

There is a large amount of worthless Big Tree seed in the market. To test the seeds when buying, break some of them crosswise. If the vital germ in the center is white, the seed is good; if brown, it is worthless.

Photograph by Boysen. 79

YOUNG SEQUOIA, MARIPOSA GROVE.

Base diameter, 17 feet. Age about 1000 years.

Celebrated Specimens.

AMONG all the largest Sequoia trees known in California, the trees named General Grant in the General Grant National Park, the General Sherman in the Sequoia National Park, and the Grizzly Giant in the Mariposa Grove, are perhaps the most notedly distinguished, although there are many others which are very close rivals.

In the General Grant National Park, the tree named General Grant is said to have

a base diameter of forty feet. It is enclosed with a picket fence, and no one is allowed inside the fence to take measurements. It is claimed by some persons to be the largest tree in the State, but a few feet above its wide-spreading base near the ground, the main body of the tree does not appear to be any larger than some others in the near vicinity.

The tree named General Sherman in the Sequoia National Park has a base circumference near the ground of one hundred and two feet. Five feet above, it measures eighty-

Photograph by Boysen. 83

WAWONA TREE, MARIPOSA GROVE.

Diameter, 28 feet; height, 260 feet; measured by Hon. B. M. Leitch, Guardian of the Grove.

four and one-half feet. Fifteen feet above, its circumference is seventy-two and one-half feet. Its height is two hundred and eighty-five feet. The body of the tree tapers but very little for one hundred feet or more up. Its elevation above sea level, as reported by the United States Geological Survey, is 6,852 feet. It is a splendid tree, and probably contains more solid cubic feet of wood than any other known tree in California.

The Grizzly Giant is the acknowledged patriarch of the Mariposa Grove of Sequoias. It is not so tall and graceful

in general outline, nor is its cubical contents as great as some other trees in the grove. It is located on more comparatively open and dry ground, and has a unique individuality of majestic grandeur all its own, different from any other known Sequoia. It has been very badly injured by fires during unknown past centuries, leaving only four narrow strips of sapwood conecting with its roots. Many of its top branches have been broken down by the weight of heavy winter snows and fierce gales of wind. One of its large branches, one hundred feet

Photograph by Fiske. 87

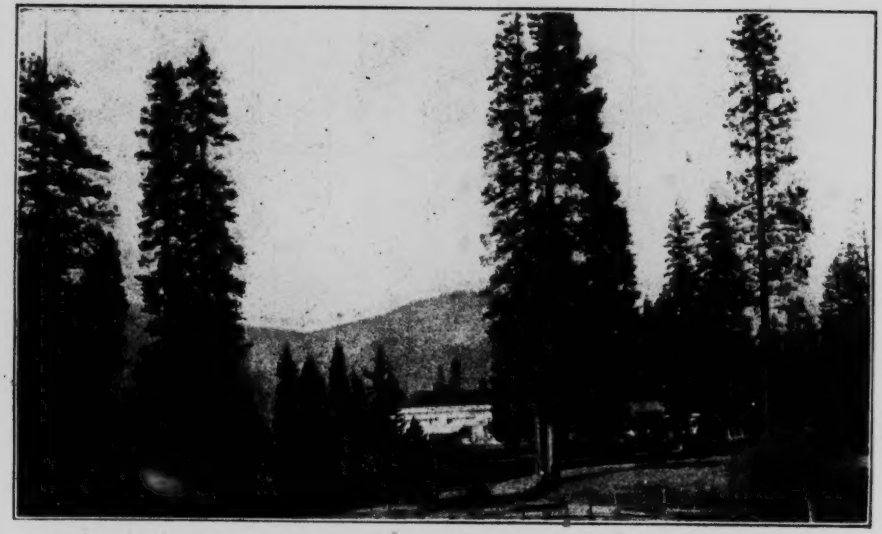
GRIZZLY GIANT, MARIPOSA GROVE.
Circumference at base, 104 feet.

above the ground, is six feet and seven inches in diameter, as measured by surveyor's transit. Its present base circumference is ninety-three feet without making any allowance for the large part burned away, which if done would increase it to over one hundred feet.

As a result of the great injuries it has sustained from the destructive elements and lack of moisture in the ground during the past few centuries, the wood growth has been very slow, the annual ring increase being as thin as wrapping paper, too fine to be counted with the unaided eye. The inside

growth of bark has been equally slow, and has not been equal to the wear and disintegration on the outside by the elements. The bark is now worn down smooth and very thin, and probably the tree does not now measure as much in circumference as it did several centuries ago. According to the best estimates made by the examination of the annual ring growths in some of the remains of old fallen Sequoias, the Grizzly Giant must be not less than six thousand years old, yet still living, grizzled with age, defying old Time with his legions of furies which

have shattered its royal crown, stripped its body nearly bare, and cut off its main source of nutriment. Dying for centuries, yet still standing at bay, it is probably not only the oldest living tree, but also the oldest living thing on earth.



Photograph by Reichel.

WAWONA HOTEL AND COTTAGES.
Near Mariposa Big Tree Grove.

A Solitary Survivor.

THE Big Tree named Boole, left standing in the Sanger Lumber Company's logging camp, is a close rival in size to any other of the largest trees in California. It has a base circumference of a little over one hundred feet. But since its strong bodyguard of surrounding forest trees, which have protected it from its infancy, have all been slaughtered for the saw mills, and it is left standing alone, its own colossal size becomes its great-

est weakness, and it must soon succumb to the tempests which occasionally sweep through the mountain forests.

Photograph by Sweeney. 97

THE BOOLE TREE, KINGS RIVER GROVE.
Sanger Lumber Company's Camp.
Circumference at base, 106 feet.

Other Celebrated Trees.

THERE are two trees in the Mariposa Grove which have driveways cut through them, one being known as the Wawona Tree, twenty-eight feet in diameter, and the other as the California, twenty-one feet in diameter. These trees had been burned to such an extent that widening out the passage for stages did not injure the roots or vitality, and cannot properly be termed an act of spoliation or vandalism. A ride through these trees in a

six-horse stage, or any conveyance, is a great novelty and should not be missed.

There is also a carriage road cut through the Dead Giant in the Tuolumne Grove, and through the tree Pioneer in the Calaveras Grove.

Photograph by Boysen.

DEAD GIANT, TUOLUMNE GROVE.

Botanical Nomenclature.

THE selection of a correct botanical name for the Big Trees has been a subject of much controversy among the best authorities, and still remains an open question. Since first discovered the species has received several different names from eminent botanists, the most noted ones being the following:

Wellingtonia Gigantea - - Lindley, 1853
Sequoia Gigantea - - - Decaisne, 1854
Taxodium Washingtonianum—
Winslow, 1854
Sequoia Wellingtonia - - Seaman, 1855
Sequoia Washingtoniana—
Winslow and Sudworth, 1898

A large majority of botanists now agree upon the name *Sequoia Washingtoniana* as being the correct one.

A near relative of the *Sequoia Washingtoniana* is the *Sequoia Sempervirens,* the Redwood of the Coast Range of mountains. This tree flourishes best in the moist atmosphere and fogs from the Pacific Ocean, while the *Sequoia Washingtoniana* prefers the pure exhilerating atmosphere of the high Sierras. The name *Sequoia* is supposed to be derived from Sequoia (or Sequoyah), a Cherokee Indian of mixed blood, who invented an alphabet and written language for his tribe.

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